IN THE CLAIMS

The following is a complete listing of the claims, and replaces all earlier versions and listings.

1. (currently amended) A printed circuit board element, ~~(1) including~~ comprising:

at least one optical waveguide ~~(6)~~ provided in an optical layer; ~~(3)~~ and

at least one optoelectronic component ~~(4, 5; 4', 5')~~ in optical connection with the optical waveguide ~~(6)~~,

wherein the optical layer is a single layer of a photoreactive material capable of two photon absorption processing,

wherein ~~characterized in that~~ the optoelectronic component ~~(4, 5; 4', 5')~~ is embedded in the optical layer ~~(3)~~, and

wherein ~~that~~ the optical waveguide, ~~(6)~~ which is structured by irradiation and a two photo absorption process, and which adjoins the optoelectronic component, ~~(4, 5; 4', 5')~~, is present within ~~and that~~ the optical ~~waveguide~~ layer ~~is structured by irradiation within the optical layer (3)~~.

2. (currently amended) The printed circuit board element according to claim 1, ~~characterized in that~~ wherein the optoelectronic component ~~(4, 5; 4', 5') with~~ on one side borders [[upon]] a substrate ~~(2)~~ carrying the optical layer ~~(3), or a cladding layer (3'; 21) applied thereon, respectively~~.

3. (currently amended) The printed circuit board element according to claim 1,

~~characterized in that~~ wherein the optoelectronic component ~~(4, 5; 4', 5')~~ is on all sides embedded in the optical layer ~~(3, 3') formed, for instance, by two plies~~.

4. (currently amended) The printed circuit board element according to claim 3, ~~characterized in that~~ wherein the optical layer ~~(3, 3')~~ is ~~realized as~~ a flexible layer.

5. (currently amended) The printed circuit board element according to claim 1, ~~characterized in that~~ wherein at least two optoelectronic components ~~(4, 5; 4', 5')~~ connected with each other via the optical waveguide ~~(6)~~ are embedded in the optical layer ~~(3)~~.

6. (currently amended) The printed circuit board element according to claim 1, ~~characterized in that~~ wherein ~~the, or~~ at least one[[,]] optoelectronic ~~component(s)~~ component borders [[upon]] a heat-dissipation layer ~~(21') by~~ on one side.

7. (currently amended) The printed circuit board element according to claim 6, ~~characterized in that~~ wherein the heat dissipation layer ~~(21')~~ is formed by a patterned inner ply.

8. (currently amended) The printed circuit board element according to claim 1, ~~characterized in that~~ wherein the optoelectronic component ~~(5)~~ is combined with an associated electronic component ~~(14)~~ to form an embedded component unit ~~(514)~~.

9. (currently amended) The printed circuit board element according to claim 8,

~~characterized in that~~ wherein the embedded unit ~~(514)~~ is an optoelectronic chip.

10. (currently amended) The printed circuit board element according to claim 1, ~~characterized in that~~ wherein the optoelectronic component ~~(4, 5)~~ borders upon an electrically conductive distribution layer ~~(21')~~.

11. (currently amended) The printed circuit board element according to claim 10, ~~characterized in that~~ wherein the distribution layer ~~(21')~~ is connected with at least one external electrical contact.

12. (currently amended) The printed circuit board element according to claim 11, ~~characterized in that~~ wherein the distribution layer ~~(21')~~ is connected with the at least one external electrical contact through a via ~~(22)~~ provided in ~~the~~ a substrate ~~(7')~~ that carries the distribution layer and the optical layer.

13. (currently amended) The printed circuit board element according to claim 1, ~~characterized in that~~ wherein a printed circuit board layer ~~(7, 7')~~ having at least one of a patterned, conductive inner ply ~~(21, 21') and/or~~ and an outer ply ~~(9, 9')~~ is applied on at least one side of the ~~electrically insulating~~ optical layer ~~(3)~~ which is an electrically insulating layer.

14. (currently amended) The printed circuit board element according to claim 1, ~~characterized in that~~ wherein the optoelectronic component ~~(4, 5), or optionally the unit (514),~~ is contacted through vias ~~(10)~~ provided in the optical layer ~~(3)~~ as well as~~, optionally,~~ in

a printed circuit board layer ~~(7)~~ applied on the same.

15. (currently amended) The printed circuit board element according to claim 14, ~~characterized in that~~ wherein an electronic component ~~(13, 14)~~ connected with the optoelectronic component ~~(4, 5)~~ is mounted to the printed circuit board layer ~~(7)~~.

16. (currently amended) The printed circuit board element according to claim 1[[,]] further comprising at least one ~~of characterized in that the~~ optoelectronic component ~~(4', 5')~~ is as a component produced in situ by a thin-film technique~~, characterized in that the optoelectronic component is a VCSEL component (34) to which the optical waveguide adjoins, e.g. with an arc-shaped transition (33'), characterized in that the optoelectronic component (6) is widened in a funnel-shaped manner on its end (34) adjacent the optoelectronic component (4), characterized in that the optical waveguide (6) at least partially encloses the optoelectronic component (4) on its end (37, 39) adjacent the optoelectronic component (4), or characterized in that the optical waveguide (6) is provided with a photonic light-diffractive crystal structure (38) on its end adjacent the optoelectronic component (4)~~.

17. (canceled)

18. (canceled)

19. (canceled)

20. (canceled)

21. (currently amended) [[The]] A method for producing a printed circuit board element, ~~(1) according to claim 1, characterized in that~~ comprising the steps of:

mounting at least one optoelectronic component ~~(4, 5; 4', 5') is mounted~~ to a substrate; and ~~(2), that~~

subsequently applying to the substrate an optical layer, ~~(3)~~ comprised of an optical material changing its refractive index under photon irradiation, ~~is subsequently applied to the substrate~~ while embedding the optoelectronic component ~~(4, 5; 4', 5')~~ in the optical layer (3), and [[that,]] thereafter[[;]] producing ~~, a~~ an optical waveguide structure ~~(6)~~ adjoining the optoelectronic component ~~(4, 5; 4', 5') is produced~~ within [[in]] the optical layer ~~(3)~~ by photon irradiation, said optical waveguide structure being surrounded by the remaining optical layer.

22. (currently amended) The method according to claim 21, ~~characterized in that~~ wherein at least two optoelectronic components ~~(4, 5; 4', 5')~~ are mounted to the substrate ~~(2)~~ and embedded in the optical layer ~~(3)~~ and thereafter are connected with each another by the optical waveguide ~~(6)~~ directly adjoining the same.

23. (currently amended) The method according to claim 21, ~~at least one of characterized in that,~~ wherein after the production of the optical waveguide structure ~~(6) in~~ within the optical layer ~~(3)~~, a printed circuit board layer ~~(7, 7')~~ including [[a]] at least one of a conductive inner ply ~~(21, 21') and/or~~ and an outer ply ~~(9, 9')~~ is applied to at least one side of said optical layer ~~(3), characterized in that the inner ply (21, 21') is patterned before applying~~

~~the printed circuit board layer to the optical layer, or characterized in that the outer ply (9, 9')~~ ~~is patterned after the application of the printed circuit board layer to the optical layer~~.

24. (canceled)

25. (canceled)

26. (currently amended) The method according to claim 23, ~~characterized in that~~ wherein vias ~~(22)~~ are provided in the optical layer ~~(3), optionally also~~ and in the printed circuit board layer ~~(7, 7')~~, in coordination with the respective optoelectronic component ~~(4, 5; 4', 5')~~ and ~~that~~ electrically conductive connections to the optoelectronic component are established through said vias.

27. (currently amended) The method according to claim 26, ~~characterized in that~~ wherein at least one electronic component ~~(13, 14)~~, which is conductively connected with the optoelectronic component ~~(4, 5)~~, is mounted to the printed circuit board layer ~~(7)~~ and/or the substrate.

28. (currently amended) The method according to claim 21, ~~at least one of characterized in that~~ wherein an optoelectronic component ~~(5)~~ which is combined to a combined optoelectronic-electronic unit with an associated electronic component ~~(14)~~ is mounted to the substrate and embedded in the optical layer~~, or characterized in that the substrate (3) is provided with at least one cladding layer (3', 21) before applying the optoelectronic~~

~~component (4, 5) thereto~~.

29. (canceled)

30. (currently amended) The method according to claim [[29]] 44, ~~at least one of characterized in that~~ wherein ~~a cladding~~ the cover layer ~~(3')~~ is comprised of optical material, and is applied to the substrate ~~(3), characterized in that an electrically conductive cladding layer (21') is applied to the substrate as a distribution layer, said distribution layer being subsequently patterned, if required~~.

31. (canceled)

32. (currently amended) The method according to claim 31~~0~~, ~~at least one of characterized in that~~ wherein electrical connections for the optoelectronic component ~~(4, 5)~~ are established throughout the distribution layer~~, or characterized in that the distribution layer is configured as a heat-dissipation layer~~.

33. (canceled)

34. (currently amended) The method according to claim 21, ~~at least one of characterized in that~~ wherein the optoelectronic component ~~(4, 5)~~ is produced in situ on the substrate ~~(3)~~ by a thin-film technique~~, characterized in that the optical waveguide structure (6) is produced with a funnel-shaped widening (37) on its end adjacent the optoelectronic component (4),~~

~~characterized in that the optical waveguide structure (6) is produced with an end region (37, 39) at least partially enclosing the optoelectronic component (4), or characterized in that the optical waveguide structure (6) is produced with a photonic light-diffractive crystal structure (38) on its end adjacent the optoelectronic component (4).~~

35. (canceled)

36. (canceled)

37. (canceled)

38. (new) The printed circuit board element according to claim 1, wherein the optoelectronic component is a VCSEL component to which the optical waveguide adjoins with an arc-shaped transition.

39. (new) The printed circuit board element according to claim 1, wherein the optical waveguide is widened in a funnel-shaped manner on its end adjacent the optoelectronic component.

40. (new) The printed circuit board element according to claim 1, wherein the optical waveguide at least partially encloses the optoelectronic component on its end adjacent the optoelectronic component.

41. (new) The printed circuit board element according to claim 1, wherein the optical waveguide is provided with a photonic light-diffractive crystal structure on its end adjacent the optoelectronic component.

42. (new) The method according to claim 23, wherein the inner ply is patterned before applying the printed circuit board layer to the optical layer.

43. (new) The method according to claim 23, wherein the outer ply is patterned after the application of the printed circuit board layer to the optical layer.

44. (new) The method according to claim 21, wherein the substrate is provided with at least one cover layer before applying the optoelectronic component thereto.

45. (new) The method according to claim 29, wherein an electrically conductive cover layer is applied to the substrate as a distribution layer, said distribution layer being subsequently patterned, if required.

46. (new) The method according to claim 31, wherein the distribution layer is configured as a heat-dissipation layer.

47. (new) The method according to claim 21, wherein the optical waveguide structure is produced with a funnel-shaped widening on its end adjacent the optoelectronic component.

48. (new) The method according to claim 21, wherein the optical waveguide structure is produced with an end region at least partially enclosing the optoelectronic component.

49. (new) The method according to claim 21, wherein the optical waveguide structure is produced with a photonic light-diffractive crystal structure on its end adjacent the optoelectronic component.